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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/500,124

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EXAMINER

NGUYEN, KHANH TUAN

ART UNIT

PAPER NUMBER

1796

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DELIVERY MODE

01/21/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/500,124	Applicant(s) TAKAHASHI ET AL.	
	Examiner KHANH T. NGUYEN	Art Unit 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 November 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4-6,9-18 and 20-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4-6,9-18 and 20-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>n/a</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Final

Response to Amendment

1. The amendment filed on 11/25/2008 is entered and acknowledged by the Examiner. Claims 1, 4-6, 9-18, and 20-24 are currently pending in the instant application. Claims 2-3, 7-8, and 19 have been canceled.

2. The rejection of claims 1, 5-6, 9-12, 14-17, and 20-24 under 35 U.S.C. 103(a) as being unpatentable over Johnson Matthey Co. Ltd. et al. (G.B. Pat. 566,718) in view of Morrison, Jr. (U.S. Pat. 5,242,623) is maintained for the reasons set forth therein.

The rejection of claims 1, 4-6, 9-10, 13-18, and 20-24 under 35 U.S.C. 103(a) as being unpatentable over Kudas et al. (U.S. Pat. 6,951,666 B2) in view of Morrison, Jr. (U.S. Pat. 5,242,623) is maintained for the reasons set forth therein.

The rejection of claim 8 under 35 U.S.C. 103(a) is deemed moot in view of the instant cancellation.

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. The amendment to claims 11-13 and 22-23 are noted. However, the amended claims remain unpatentable over the prior art of record for the reasons set forth below.

5. Claims 1, 5-6, 9-12, 14-17, and 20-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson Matthey Co. Ltd. et al. (G.B. Pat. 566,718 hereinafter, G.B. '718") in view of Morrison, Jr. (U.S. Pat. 5,242,623 hereinafter, "U.S. '623").

With respect to instant claims 1, 5-6, 9-10, 16-17, 20-21 and 24, G.B. '718 teaches a screen printable thick film paste useful as an electrical resistor or conductor on non-metallic articles (Pg. 1, lines 8-19 and 42-47; Pg. 3, lines 55-56). The said thick film paste comprising of a finely divided silver compound comprises of silver oxide, silver carbonate or silver oxalate that is reduced by a reducing agent such as formaldehyde and formic acid (Pg. 1, lines 90-110). The silver compound is prepared by reducing a silver oxide with formaldehyde in a solution of silver nitrate (Example 1). The said silver compound is mixed with 5 to 10% of lead borosilicate flux and the mixture is ground with 10% solution of cellulose nitrate in a 2:1 mixture of amyl lactate and pine oil to form a paste for silk screen printing (Example 1). The said paste is printed onto a non-metallic article and fired (i.e. heated) at a temperature at which the organic matter burns off and causes the silver powder to adhere firmly to the surface of the article forming a film of metallic silver (Page 1, lines 47-53 and Page 2, lines 68-82).

The difference between the instant application and G.B. '718 disclosure is that G.B. '718 does not suggest the average particle diameter of the finely divided silver compound is about 0.01-10 microns. In addition, G.B. '718 uses cellulose nitrate instead of the claimed hydroxypropyl cellulose as a dispersant.

In an analogous art of screen printable thick film paste, U.S. '623 teaches a screen printable thick film paste useful as a conductive, resistive or dielectric material that can be applied onto an electrical insulating material such as alumina and ceramic (Col. 1, lines 13-16; Col. 2, lines 27-30 and line 59). The thick film resistor paste may contain resistive material such as metal oxides or noble metal (e.g. Ag) having a preferred particle size in the range of 0.1-10 microns (Col. 2, lines 33-53). The metal oxides is mixed in an organic medium comprising of a resin selected from ethyl cellulose, *cellulose nitrate*, hydroxyethyl cellulose, ethylhydroxyethyl cellulose, carboxymethyl cellulose, *hydroxypropyl cellulose* and the mixture and the derivatives thereof dissolved in a solvent such as alpha- or beta-terpineol (*pine oil*) and alcohols (Col. 3, line 10 to Col. 4, line 9).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the screen printable thick film paste of G.B. '718 by incorporating a finely divided silver oxide compound (fine metal oxide) of G.B. '718 having a particle size in the range of 0.1-10 microns as suggested by U.S. '623 into the paste and further substituting the cellulose nitrate of G.B. '718 with hydroxypropyl cellulose of U.S. '623 because such substitution is explicitly suggest by the prior art. The burden is upon the applicant to prove otherwise. *In re Fitzgerald*, 205 USPQ 594. In addition, the composition suggest by the prior art contains similar compounds as claimed, thus it would generally be expected to have similar properties (e.g. volume resistivity (W), specific gravity (X), the number of pores (Y) and viscosity as recited in claims 1, 9, 21, and 23) since it has been held by the court that structurally similar

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compounds are generally be expected to have similar properties. In re Gvurik, 596 F. 2d 1012, 201 USPQ 552. For example at column 4 lines 30-40, U.S. '623 teaches a thick film paste composition having similar viscosity as the claimed composition. Furthermore, the court has held that compositions are indefinite for being defined in terms of properties alone. *Ex parte Spacht*, 165 USPQ 409 (PO Bd Pat App 1969); *Ex parte Slob* 157 USPQ 172 (PO Bd Pat. App 1967); *Ex parte Pulvari*, 157 USPQ 169 (PO Bd Pat. App 1966).

Regarding claims 14 and 15, G.B. '718 teaches using a reducing agent to produce a finely divide silver particulate compound (Pg. 2, line 100 to Pg. 3, line 5). However, G.B. '718 does not explicitly suggest using the said reducing agent in an amount of about 0.5-10 moles (or 20 moles or less) with respect to about 1 mole of the particulate silver compound as recited in the instant claims. Nonetheless, it would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the proportions of the reducing agent and particulate silver compound of G.B. '718 through routine experimentation for best results. As to optimization results, a patent will not be granted based upon the optimization of result effective variables when the optimization is obtained through routine experimentation unless there is a showing of unexpected results which properly rebuts the *prima facie* case of obviousness. Applicants have not submitted factual evidence showing the criticality of the amount of reducing agent and that the claimed amount of reducing agent distinguish over the prior art.

6. Claims 1, 4-6, 9-10, 13-18, 20, and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kodas et al. (U.S. Pat. 6,951,666 B2 hereinafter, "Kodas") in view of Morrison, Jr. (U.S. Pat. 5,242,623 hereinafter, "U.S. '623").

With respect to claims 1, 4-6, 9-10, 13-18, and 20-24, Kodas discloses precursor composition (i.e. electrically conductive paste) forming a thick-film on a substrate such as plastic by screen printing (Col. 1, lines 21-24; Col. 27, lines 3-23; Col. 29, lines 22-25; Col. 37, lines 64-68). The precursor composition comprising of metal precursor, solvents, micron-sized or nano-size particles having an average size of at least about 0.1 micron (Col. 4, lines 24-25 and Col. 24, lines 45-48), nanoparticles having average size from about 10 to 80 nanometer (Col. 4, lines 27-28), vehicles, reducing agent and other additives such as dispersant (Col. 2, lines 58-61 and Col. 4, lines 15-20). Kodas also discloses silver metal precursor are preferred, in particular, silver nitrate, silver oxide and silver carbonate (Table 1, Col. 8, lines 63-67 and Col. 14, lines 18-19). Kodas discloses a method of obtaining the silver metal precursor by vapor deposition method such as CVD or PVD (Col. 6, lines 36-63). The reference further discloses a inducing agent (i.e. reducing agent) such as alpha terpineol (pine oil) or other low vapor pressure solvent such as diethylene glycol, ethylene glycol, hexylene glycol, NMP, tri(ethylene glycol) dimethyl ether and ethylene glycol diacetate capable of reducing silver oxide to silver at low temperature (Col. 13, lines 57-64, Col. 15, lines 46-53 and Table 4). The reducing agent is preferably at least about 20-60 weight percent (Col. 15, lines 21-28). Kodas discloses the electrically conductive paste composition may be

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printed onto a substrate (Col. 29, lines 10-21) and follow by heat treatment (Col. 29, lines 45-50) to form a metallic film (Col. 32, lines 46-52; and Table 6). Kudas further discloses a rheology modifier for improving particle dispersion is selected from styrene allyl alcohol, *ethyl cellulose*, *carboxyl methylcellulose*, *nitrocellulose*, polyalkylene carbonates, ethyl nitrocellulose and the (Col. 20, lines 46-55).

The difference between the instant application and Kudas disclosure is that Kudas suggest using ethyl cellulose, carboxyl methylcellulose and nitrocellulose instead of the claimed hydroxypropyl cellulose as a dispersant.

In an analogous are of screen printable thick film paste, U.S. '623 teaches a screen printable thick film paste useful as a conductive, resistive or dielectric material that can be applied onto an electrical insulating material such as alumina and ceramic (Col. 1, lines 13-16; Col. 2, lines 27-30 and line 59). The thick film resistor paste may contain resistive material such as metal oxides or noble metal (e.g. Ag) having a preferred particle size in the range of 0.1-10 microns (Col. 2, lines 33-53). The metal oxides is mixed in an organic medium comprising of a resin selected from *ethyl cellulose*, *cellulose nitrate*, hydroxyethyl cellulose, ethylhydroxyethyl cellulose, *carboxymethyl cellulose*, *hydroxypropyl cellulose* and the mixture and the derivatives thereof dissolved in a solvent such as alpha- or beta-terpineol (*pine oil*) and alcohols (Col. 3, line 10 to Col. 4, line 9).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the screen printable thick film paste of Kudas by substituting the ethyl cellulose, carboxyl methylcellulose and nitrocellulose of Kudas

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with hydroxypropyl cellulose of U.S. '623 because such substitution is explicitly suggest by the prior art. The burden is upon the applicant to prove otherwise. *In re Fitzgerald*, 205 USPQ 594. In addition, the composition suggest by the prior art contains similar compounds as claimed, thus it would generally be expected to have similar properties (e.g. volume resistivity (W), specific gravity (X), the number of pores (Y) and viscosity as recited in claims 1, 9, 21, and 23) since it has been held by the court that structurally similar compounds are generally be expected to have similar properties. *In re Gvurik*, 596 F. 2d 1012, 201 USPQ 552. For example, both Kudas (Abstract) and U.S. '623 (Col 4, lines 30-40) teach a thick film paste composition having similar viscosity as the claimed composition. Furthermore, the court has held that compositions are indefinite for being defined in terms of properties alone. *Ex parte Spacht*, 165 USPQ 409 (PO Bd Pat App 1969); *Ex parte Slob* 157 USPQ 172 (PO Bd Pat. App 1967); *Ex parte Pulvari*, 157 USPQ 169 (PO Bd Pat. App 1966).

Regarding claim 20, the lower limit of the instant claim includes 0 (zero) parts of dispersant, hence, the reference need not teach the presence of dispersants.

Regarding claim 21, U.S. '623 discloses a viscosity within the claimed range (Col. 4, lines 30-40). Kudas discloses a viscosity of at least about 1000 centipoise, which is equivalence to at least about 10 poise (Abstract).

Response to Arguments

7. Applicant's arguments filed on 11/25/2008 have been fully considered but they are not persuasive.

8. In response to the Applicant's remark on pages 7-8, Applicant argues that it would not have been obvious to optimize the proportion of the reducing agent and particulate silver compound of G.B. '718 in view of U.S. '623 through routine experimentation for best results as recited in claims 14 and 15. The Examiner respectfully disagrees with the Applicant argument.

*"14. (Previously Presented) An electrically conductive paste according to claim 1, wherein the amount of reducing agent used is about 20 moles **or less** with respect to about 1 mole of particulate silver compound."*

The term "or less" recited in claim 14 above may include 0 (zero) as the lower limit. Thus, the prior art need not teach the presence of a reducing agent per mole of particulate silver compound as recited in claim 14. In addition, G.B. '718 teaches a finely divided metal powder may be produced by reducing a metal powder with an organic or inorganic reducing agent (Page 1, lines 69-86). Thus, it is within the expected skill of one having an ordinary skill in the art at the time of the invention was made to have a reducing agent within the claimed amount as recited in claim 15, since G.B. '718 teaches an organic or inorganic reducing agent can be used to reduce a metal powder to form a finely divided metal powder. One having an ordinary skill in the art can arrive that the optimum or workable ranges through routine experimentation. It is noted that Applicants have not submitted factual evidence showing the criticality of the amount of the reducing agent (i.e. 0.5-10 moles of reducing agent per mole of

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particulate silver compound) and that the claimed amount of reducing agent show unexpected results and or distinguish over the prior art. Therefore, the rejection of claims 1, 5-6, 9-10, 14-17, 20-21, and 24 under 35 U.S.C. 103(a) as being unpatentable over G.B. '718 in view of U.S. '623 is maintained.

9. In response to the Applicant's remark on pages 8-10, Applicant argues that the combination of G.B. '718, U.S. '623, or Kodas does not teach or suggest the newly amended features of claim 1, i.e. to recite

"the volume resistivity of an electrically conductive coating comprising the electrically conductive paste is about 3.0×10^{-6} to about $8.0 \times 10^{-6} \Omega\text{cm}$, which satisfies the following formula (1) when W represents the volume resistivity (Ωcm) of the electrically conductive coating and X represents its specific gravity: $W \leq -1.72 \times 10^{-6} \times X + 2.3 \times 10^{-5} (1)$ ".

The Examiner respectfully disagrees with the Applicant argument. The Examiner's position is that the composition suggested by the prior art contains similar compounds as claimed, therefore it would generally expect to have similar properties since it has been held by the court that structurally similar compounds, i.e. thick film pastes, are generally be expected to have similar properties. In re Gvurik, 596 F. 2d 1012, 201 USPQ 552. For example, Applicant should refer to the Abstract of Kodas and column 4 lines 30 to 40 of U.S. '623 wherein the references suggest a composition having similar viscosity (property) as the claimed composition. Therefore, the composition of the prior art is expected to have other properties that are similar to the claimed composition, specifically a volume resistivity (W) and a specific gravity (X) that would satisfy formula (1) as recited in claim 1.

Based on the above rational, it is believed that the combined references teach or suggest a composition that achieves the claimed relationship of the instant composition and therefore, the rejection is maintained.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KHANH T. NGUYEN whose telephone number is (571)272-8082. The examiner can normally be reached on Monday-Friday 7:00-4:00 EST PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on (571) 272-1302. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KTN/
01/06/2009

/DOUGLAS MC GINTY/
Primary Examiner, Art Unit 1796